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STATUS OF ATLANTIC SALMON (*Salmo salar*) IN THE TABUSINTAC RIVER IN 1998 AND SUMMARY OF THE 1996 STOCK ASSESSMENT

S. G. Douglas[2], D. Swasson, R. G. Bradford[3], and M. Joe

Esgenoôpetitj (Burnt Church) First Nation
RR#2, Legaceville, New Brunswick
E0C 1K0

[2] 637 Front Mountain Road
Moncton, New Brunswick
E1G 3H2

[3] Department of Fisheries and Oceans
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia
B2Y 4A2

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ABSTRACT

Esgenoôpetitj First Nation and the recreational angling community harvested Atlantic salmon from the Tabusintac River in 1998. First Nation food fishery removals of small salmon (n =18) and large salmon (n =18) were 16% and 6% of the respective communal allocations. A telephone creel survey conducted for public water angling during the 1998 season, indicated that total bright salmon catches were about 25% of the previous five year mean. Low reported catches in 1998 for both large (n =32) and small (n =39) salmon on leased water were attributed to high water conditions. Total returns of Atlantic salmon to the Tabusintac River in 1998 were estimated from a mark-recapture experiment using tags applied at an estuary trapnet and the combined catches and recaptures from an upstream (recapture) trapnet and the angling fishery in leased waters. Most probable combined total returns, generated by a Bayes algorithm, were estimated to be 2900 fish. Large and small salmon components were estimated using the ratio of large to small salmon captured in both the marking and recapture trapnets and the associated probabilities from the Bayesian method. Large and small salmon returns were estimated to be 1200 and 1800 fish respectively. After accounting for removals, large salmon spawning escapement was estimated to be 1180 fish while small salmon spawning escapement was estimated to be 1766 fish. Total estimated egg deposition was 364% of the conservation requirement. Due to the small number of recaptured tags in 1998, it is suspected that returns may have been overestimated, however, the probability of having achieved sufficient numbers of large and small salmon to meet the conservation requirement was 100% for both. A sufficient time series of information on stock status has not been accumulated to forecast either total returns or harvestable surplus.

RÉSUMÉ

Les membres de la Première Nation d'Esgenoôpetitj et les pêcheurs récréatifs ont pêché du saumon Atlantique dans la rivière Tabusintac en 1998. Les petits saumons (n =18) et les gros saumons (n =18) qui ont été capturés par la Première Nation au titre de la pêche de subsistance représentaient respectivement 16 % et 6 % des allocations communautaires respectives. Un relevé des prises (effectué au téléphone) portant sur la pêche à la ligne dans les eaux publiques au cours de la saison de 1998 a révélé que les prises globales de saumon de montée étaient d'environ 25 % de la moyenne des cinq années précédentes. On a attribué au niveau élevé de l'eau la baisse des prises signalées en 1998 tant pour les gros saumons (n =32) que pour les petits (n =39) dans les eaux louées et dans les eaux publiques. Le total des retours de saumon Atlantique dans la rivière Tabusintac en 1998 a été estimé à partir d'une expérience de marquage et de recapture à l'aide d'étiquettes qui avaient été posées dans le filet-trappe aménagé dans l'estuaire ainsi qu'à partir des données tirées des prises et des recaptures au filet-trappe posé en amont de la rivière ainsi qu'à partir des données de la pêche à la ligne dans des eaux louées. Le total combiné le plus probable des retours calculé grâce à un algorithme Bayésien s'établit à 2900 poissons. On a établi les composantes de petits et de gros saumons en utilisant le ratio de gros saumons par rapport aux petits saumons parmi les prises des filets-trappes du programme de marquage et de recapture et les probabilités connexes découlant de la méthode Bayésienne. Les retours de gros et de petits saumons ont été évalués à 1200 et 1800 respectivement. Après avoir tenu compte des captures, on a évalué le taux d'échappée des géniteurs à 1180 pour les gros saumons et à 1766 pour les petits poissons. Le total du taux de ponte évalué était de 364 % des exigences fixées pour la conservation. En raison de la petite quantité d'étiquettes qui ont été récupérées en 1998, l'on soupçonne qu'il est possible que les retours aient été surestimés. En revanche, la probabilité qu'on ait atteint les exigences aux fins de la conversation tant pour les petits que pour les gros saumons était de 100 %. On n'a pu accumuler suffisamment de séries chronologiques sur l'état des stocks pour être en mesure de prédire le total des retours ou les surplus capturables.

SUMMARY SHEET

STOCK: Tabusintac River (SFA 16)
CONSERVATION REQUIREMENT: 1.978 million eggs (329 large salmon, 175 small salmon)

	1993	1994	1995	1996	1997	1998	Min	Max	Mean
Angling[1]									
Large (Released)	191	316	22	80	63	46	14	488	148
Small (Released + Kept)	258	328	33	146	126	34	15	330	186
First Nation Harvest[2]									
Large	101	44	42	187	NA	18	42	187	
Small	79	30	106	171	NA	18	30	171	
Total Returns									
Large	799	1414	NA	920	NA	1200			
Small	599	1067	NA	615	NA	1800			
Spawning Escapement									
Large	667	1214	NA	731	NA	1180			
Small	348	844	NA	368	NA	1766			
% Egg Requirement Met									
Large	196	391	NA	244	NA	358			
Large and Small	200	404	NA	245	NA	364			

[1]Angling catch min and max are for years 1969 to 1997; mean is for 1993 to 1997.
[2]First Nation harvest min and max are for years 1993 to 1996.

Description of Fishery: Salmon are angled in leased and public water. Public angling catch estimates for 1996 and 1998 are provisional. Esgenoôpetitj First Nation harvests late run salmon by gillnet and in some years trapnets.

Aboriginal Community Harvest: The allocation of bright Atlantic salmon to the Esgenoôpetitj First Nation food fishery was 304 MSW and 112 1SW in 1998. Black salmon allocations included 100 MSW and 100 1SW.

Research Data: Tags applied at trapnets. Combined recaptures from a recapture trapnet and the angling fishery were the basis for this assessment. Biological data was collected on the adult stock.

Estimation of Stock Parameters: Bayesian estimates of total salmon returns were obtained using combined catches and recaptures from the recapture trapnet and leased water angling. Numbers of large and small salmon were calculated from the estimated total return and the combined large to small salmon ratio observed at the marking and recapture trapnets.

Assessment Results: Spawning escapement was exceeded for large and small salmon in 1998. Total egg deposition was 364% of the conservation requirement.

Ecological Considerations: High water conditions provided unimpeded upstream movement of salmon which reduced angling catches in both public and leased waters.

Forecast for 1999: No quantitative forecast can be made. Given that the conservation requirement was exceeded in all four of the last six years in which stock assessments have been carried out, it is likely that the conservation requirement will be met in 1999.

Management Considerations: There is a harvestable surplus of salmon from the Tabusintac River. The amount of this surplus is not predictable. Caution must be used when considering management options based on the current assessment.

INTRODUCTION

The Tabusintac River is situated in Northumberland County, New Brunswick and flows east into the Gulf of St. Lawrence (Long. 65.00°W; Lat. 47.34°N) (Fig. 1). The spawning run of Atlantic salmon consists of both early (June-August) and late (September-November) run components. Late run fish, which are exploited for food by Esgenoôpetitj First Nation, also comprise approximately 75-80% of the reported salmon catch by anglers on this river.

Stock assessments of the spawning run on the Tabusintac River provided the basis for management of the salmon harvest in 1994 (Atkinson and Claytor 1994), and 1995 (Atkinson and Hooper 1995) with the objective of ensuring that adequate spawning escapement occurred on a sustainable basis. There was no assessment of the resource in 1995 or 1997. The 1996 stock assessment was completed but not tabled for peer review or considered in the management of the resource for 1997. In 1998, the Department of Fisheries and Oceans provided funding to Esgenoôpetitj First Nation, under the Aboriginal Fisheries Strategy (AFS), to resume annual salmon assessments on the Tabusintac River. As was the case in 1993, 1994 and 1996, a mark-recapture experiment was the basis for the assessment. Tags (marks) were applied at First Nation research trapnets in the estuary and recovered either from an upstream trapnet or from the angling fisheries on public and leased waters. This document details the 1998 mark-recapture experiment and updates the time series of stock assessments to include the 1996 spawning season.

DESCRIPTION OF FISHERIES

Commercial

Commercial harvesting of Atlantic salmon ceased at the end of the 1983 fishing season. The harvest from 1967 to 1983 in Salmon Fishing Area (SFA) 16 was presented in Atkinson and Claytor (1994).

First Nation

Esgenoôpetitj First Nation harvests salmon from the Tabusintac River during September and October using gillnets and in some years trapnets. With the exception of 1997, First Nation fishery guardians have provided harvest statistics from gillnets, as well as food fish removed from trapnets, since 1992 (Table 1). Other species harvested for food with gillnets include striped bass (*Morone saxatilis*) and brook char (*Salvelinus fontinalis*) with landings of both species limited to agreed upon communal allocations. Because gillnets are not selective with respect to species caught and the overlap in timing of species migrations, this fishery is subject to closure as soon as the communal allocation of any one of the finfish species is reached.

In 1996, the gillnet fishery was closed on 15 October, after the allowable communal catch of 150 striped bass was landed, but not before 154 (82%) large salmon and 142 (83%) small salmon had been harvested. The harvest of salmon continued after 15 October with removals of both marked and unmarked large and small salmon from the upstream (recapture) trapnet. The total reported 1996 salmon harvest by Esgenoôpetitj First Nation was 187 large (≥ 63 cm) and 171 small (< 63 cm) salmon (Table 1).

In 1998, the gillnet fishery remained open for the duration of the season and harvested 16 (89%) large and 18 (100%) small salmon; a combined decrease of 89% from 1996. Salmon harvests from native research traps began in mid October after the communal licence was amended to include harvesting of large and small salmon from the recapture trap only. The total reported 1998 salmon harvest for Esgenoôpetitj First Nation was 18 large and 18 small salmon (Table 1).

Recreational[4]

Recreational angling is carried out on a short (3 km) stretch of public water at the head of tide, and above this the Tabusintac Club has leased rights to angling (Crown Angling Lease 13) (Fig. 1). Kelts are angled only on the public section of the river. Prior to 1996, black salmon could be angled from April 15 to May 15 and bright salmon from July 1 to October 31, with most angling for bright salmon occurring from late September to the end of the season. Beginning in 1996, the angling season for black and bright salmon was made continuous from April 15 through October 31.

Prior to 1984, kelts and bright fish could be retained without any restriction on size. In 1984 large salmon kelts could be retained but all large bright salmon had to be released. Beginning in 1985, regulations have required all large salmon (brights and kelts) to be released, and only small salmon can be retained. In 1992, the season limit for small salmon was reduced from ten to eight fish, and this limit remains in effect to date. In 1998, as a precautionary measure to the low returns in the region during 1997, the daily bag limit was reduced to one small salmon and the maximum hook and release of two salmon (any size) per day. An in-season evaluation of the salmon run to the Miramichi river resulted in an increased daily hook and release fishery of four salmon (any size) per day while maintaining the daily bag limit of one small salmon.

Recreational catch estimates are available from two sources. Department of Fisheries and Oceans (DFO) fishery officers estimate harvest from observations of average number of rods/day and average catch during routine patrols on public water, combined with kept fish reported in leased water. The New Brunswick Department of Natural Resources and Energy (DNRE) estimates catch (harvested and released) based on a random survey of license purchasers. Since the proportion of anglers observed by DFO is not known, released fish cannot be estimated, and catch and effort are therefore inconsistent compared with DNRE estimates (Atkinson and Claytor 1994). Final estimates for 1998 have not yet been compiled by DNRE, but preliminary figures indicate that catches of bright salmon were substantially less than the previous five year mean (Table 2). Complete catch and effort statistics from the Tabusintac Club, required by the Province of New Brunswick as a condition of their lease on the river, indicate for 1998, a total of 32 large and 39 small salmon landed with all but one small salmon released. Low catches on the lease in 1998 were reported to be a consequence of high water and short residence time in pools (Herman Harding, Tabusintac Club, personal communication).

A telephone survey was conducted of 25 anglers, who collectively account for at least 80% of the total angling effort on the public waters of the river (Gary Atkinson, DFO, personal communication; personal observation). The list of anglers has been accumulated over the past 6 years as described in Atkinson and Hooper (1995). Each angler was specifically asked to report

[4] The description of the recreational fishery has been extracted from Atkinson and Hooper (1995) and updated to include the 1996 and 1998 fishing seasons.

only on large and small salmon landed (handled); i.e. not released at a distance by breaking the fishing line. Results indicated that the angling catch in 1998 was down from previous years with 46 large salmon and 21 small salmon caught and released, and 13 small salmon harvested. These catches are substantially below both the mean catch for the past five years as estimated by DNRE (Table 2), and the catch for 1996 (73 large salmon, 128 total small salmon of which 71 were harvested) as estimated via the telephone survey method (Table 2). Total removals from the angling fisheries were calculated by applying a hook and release mortality factor of 3% (Currie 1985) to all released fish and subsequently adding the result to the known removals from the respective angling fisheries.

Other

Poaching in the estuary and freshwater portion of the river was considered negligible for both 1996 and 1998. The freshwater section of the river is patrolled by Club wardens on a regular basis until ice-up. In 1998, no illegal activities were detected (Herman Harding, Tabusintac Club, personal communication). Also, there were no apprehensions or seizures of gear associated with salmon poaching by DFO fishery officers (Wayne Thompson, DFO, personal communication). Furthermore, high water conditions during autumn 1998 provided salmon with refuge and easy access to the upper reaches of the river. Reported removals from all sources for 1996 and 1998 are summarized as follows:

Summary of Removals

	1996		1998	
Location	Small	Large	Small	Large
First Nation Food	171	187	18	18
Public Angling	73[1]	2[1]	14[1]	1[1]
Lease Angling	3[1]	0[1]	2[1]	1[1]
Poaching	0	0	0	0
Total	247	189	34	20

[1] 3% hook and release mortality included.

CONSERVATION REQUIREMENT

The required number of spawners for the Tabusintac in 1996 and 1998 was calculated using Method 2 as recommended by Randall (1985) for the Miramichi River. Briefly, the number of spawners needed to meet egg deposition requirements was calculated assuming all egg deposition came from large salmon. The number of small salmon required was calculated assuming that at least one male spawner was needed for each female large salmon. Average fecundity values were assumed to be equivalent to Miramichi stock based on river proximity. Sex ratios were derived based on external characteristics.

Egg deposition rate : 2.4 eggs·m^{-2} (CAFSAC 1991)
Rearing area : 824,000 m^2 (Atkinson and Hooper 1995)

Conservation Requirement : 1.978 million eggs; 329 large salmon; 175 small salmon

RESEARCH DATA

Mark/Recapture

In 1996 and 1998, Esgenoôpetitj First Nation operated two V-style trapnets in the tidal portion of the river to mark and recapture salmon. Sampling protocols are as established during previous assessments (Atkinson and Claytor 1994; Atkinson and Hooper 1995). Briefly, salmon captured in a trapnet situated one half kilometre upstream (west) of the Route 460 bridge at Cains Point (Fig. 1) were measured, sexed on external characters, scale sampled for later ageing, marked with individually numbered Carlin tags behind the first ray of the dorsal fin, and released to the wild. The other trapnet, located approximately two kilometres upstream from the marking trap (Fig. 1) is used as the primary recapture site. All fish captured in the recapture trapnet were measured, sexed on external characters, scale sampled for ageing and either released or harvested. Trap and leader configurations and dimensions were as reported by Atkinson and Hooper (1995).

New features for 1998 included:

1) the relocation of the recapture trap to the opposite bank of the estuary in an effort to increase the generally low efficiency of the original site used during 1993, 1994, and 1996 assessments.

The trapnets were operated continuously from 26 September - 2 November, 1996 and from 21 September - 31 October, 1998. In both years salmon were intercepted on the first day of fishing whereas salmon were captured on the last day of fishing in 1996 but were not captured after 21 October in 1998 (Tables 3 and 4). Combined catch for both traps was 284 (49%) large and 292 (51%) small salmon in 1996 (Table 3) and 77 (41%) large and 111 (59%) small salmon in 1998 (Table 4). Weeks were standardized to define time series of trapnet operation, as well as, run timing of salmon to the river in both years. In 1998, peak catches of both large and small salmon occurred during the first week of October (standard week 40) (Fig. 2). Total marks applied to large and small salmon in both years are summarized below.

Tags Applied

	1996		1998	
Location	Small	Large	Small	Large
Marking Trap	145	190	81	65
Recapture Trap	40	25	0	0
Total	185	215	81	65

In both years, estimates of the total catch, the released catch and tags recovered were obtained from three available sources: the recapture trap, the angling fishery on public waters, and the angling fishery on leased waters. The reported total catches for both large and small salmon from the public angling fishery (1996) and the lease angling fishery (1998) were adjusted

for possible multiple recaptures using respective exploitation rates of the small and large salmon angling fisheries. These are summarized below.

Total Catch, Released Catch and Tags Recovered

	Large Salmon			Small Salmon		
Source	Catch	Released	Recovered	Catch	Released	Recovered
1996						
Recapture trap	68	35	14	93	64	22
Public angling	70[1]	73	9	109[2]	57	28
Lease angling	7	7	3	18	15	3
Native gillnet	154	0	2	142	0	2
1998						
Recapture trap	10	8	0	22	22	2
Public angling	46	46	0	34	21	1
Lease angling	31[3]	32	2	39[4]	38	1
Native gillnet	16	0	0	18	0	0

[1] Adjusted catch for possible multiple recaptures using exploitation rate of 0.04.
[2] Adjusted catch for possible multiple recaptures using exploitation rate of 0.15.
[3] Adjusted catch for possible multiple recaptures using exploitation rate of 0.03.
[4] Adjusted catch for possible multiple recaptures using exploitation rate of 0.01.

Biological Characteristics in 1996

Modal length of small salmon captured in the 1996 trapnet fishery was 58 cm and of large salmon, 76 cm (Fig. 3). The mean length of small salmon was 57 cm; 2% were females and 98% males. The mean length of large salmon was 79 cm; 87% were females and 13% males. The proportion of 2SW salmon, as estimated from fish between the lengths of 68.0 cm and 78.0 cm, was 59%; a significant decrease from 1993 (81% 2SW, Atkinson and Hooper, 1995) and 1994 (84% 2SW, Atkinson unpublished data).

Biological Characteristics in 1998

Modal length of small salmon captured in the 1998 trapnet fishery was 57 cm and of large salmon, 76 cm (Fig. 3). The mean length of small salmon was 57 cm; 2% were females and 98% males. The mean length of large salmon was 80 cm; 76% were females and 24% males. Although ageing of the 1998 samples is incomplete, the proportion of 2SW salmon was estimated using fish with forklengths between 68.0 and 78.0 centimetres. The proportion of 2SW salmon declined again in 1998 to a low of 44%. Alternatively, the proportion of repeat spawners has

increased from a low of 16% in 1994 (Atkinson, unpublished data) to the current level of 56% in 1998.

Stocking

The Tabusintac was stocked with salmon each year from 1953 to 1973 with the exception of 1955 and 1972 (Table 5). The origin of most (56%) of the stocked salmon were from the Restigouche River and not from the Miramichi River as previously perceived (Hayward, unpublished data).

Electroseining

There have not been any electroseining surveys beyond those reported by Atkinson and Hooper (1995) for 1994.

ESTIMATION OF STOCK PARAMETERS

In 1996

Two recapture samples were available for estimation of stock parameters; one from the recapture trap and the other from the angling on public water. Angling returns of large and small salmon from lease waters were considered to be too few to provide precise estimates of stock size in 1996 (see text table pg. 9).

A Bayesian estimator, as described by Gazey and Staley (1986), was used to calculate total returns separately for large and small salmon. The most probable population size given R recaptures out of M marks placed in a sampled catch of C was calculated over a range of possible population sizes. Only tags applied in the current year were used. Tag loss was assumed to be negligible over the short period (one month) of the experiment. The exploitation rate of the gillnet fishery, although unknown, was assumed to be the same for both marked and unmarked fish, although there are no data in support of this view. Only four tags, all from one fisher, were returned from the gillnet fishery which landed 296 fish. Spawning escapement was calculated by subtracting the known removals from all sources (native food fishery + angling) from the calculated estimate of total returns. A 3% hook and release mortality factor (Currie 1985) was applied to the catch data from the angling fishery. The values of C, R, and M for the recapture trap sample were defined as follows.

Recapture Trap Sample
C = total catch of either large or small salmon in recapture trap
R = number of recaptures of either large or small salmon in recapture trap where,
M = marks applied in lower trap only to either large (n =190) or small salmon (n =145)

Public Water Angling Sample

Two methods were used to calculate stock parameters from the public water angling sample. In both methods the tags applied at both traps were pooled to estimate returns past the

marking sites. The first method assumed that the reported number of marked and unmarked large salmon landed were accurate. Therefore,

C = total reported catch of either large or small salmon on public waters
R = number of recaptures of either large or small salmon on public waters where,
M = total marks available from tagging at both trapnets to either large (n =208) or small salmon (n =177), and after adjusting for removals from the recapture trapnet of 8 marked small salmon and 7 marked large salmon as food fish.

A further estimate for large salmon total returns was obtained following the method of Atkinson and Hooper (1995), which can be summarized as follows.

C_{small} = total reported catch of small salmon on public waters
R_{small} = number of recaptures of small salmon on public waters
M_{small} = total marks applied at both trapnets to small salmon (n =185)

The total large salmon return (P_{large}) was then estimated as

P_{large} = (total small salmon returns x observed large:small ratio at both trapnets)

where the large salmon proportion of combined trapnet captures, exclusive of recaptures from the same trapnet was 54% for 1996.

In 1998

Recapture samples were available for estimation of stock parameters from the recapture trap and from angling on leased water. The number of recaptures from these respective samples were too few to stand alone in the computations and were therefore pooled in order to achieve the most robust estimate possible. Angling returns of large and small salmon from public waters were considered to be too few to provide precise estimates of stock size (see text table pg. 9).

A Bayesian estimator, as described by Gazey and Staley (1986), was used to calculate total returns of large and small salmon combined. The most probable population size given R recaptures out of M marks placed in a sampled catch of C was calculated over a range of possible population sizes. Only tags applied in the current year or tags applied in a previous year that were observed at the marking trap were used. Tag loss was assumed to be negligible over the short period (one month) of the experiment. Total returns of large and small salmon were computed independently as proportions of the combined total returns (Bayesian method) coupled with the binomial distribution of probabilities of the combined catches at both trapnets. Spawning escapement was calculated by subtracting the known removals from all sources (native food fishery + angling) from the calculated estimate of large and small salmon total returns. A hook and release mortality factor of 3% (Currie 1985) was applied to the catch data from the angling fisheries. The values of C, R, and M were defined as follows:

C = combined total catch of large and small salmon in the recapture trap and leased water angling
R = combined number of recaptures from the recapture trap and leased water angling
M = marks applied in the marking trap to all salmon (n =146)

ASSESSMENT RESULTS

In 1996

Total Returns, Spawning Escapement, and Conservation Requirement

Recapture Trapnet Sample

The most probable estimates of total returns to the river were 920 large salmon and 615 small salmon (Table 6). The large salmon total returns were 65% of those last reported for this river in 1994 (1414 fish; Atkinson and Hooper 1995). Similarly, the small salmon total returns are only 58% of those reported for 1994 (1067; Atkinson and Hooper 1995). After subtracting removals, spawning escapement for large salmon was 731 and for small salmon 368 (Table 6), which represents 245% of the egg deposition requirement for this river. These data indicate that the conservation requirement for this river were likely met in 1996, albeit with a lower certainty for small salmon.

Public Water Angling Sample

Data returned by anglers who fished on public waters yielded results similar to those derived from the trapnet sample for small salmon, but equivocal results for large salmon. Small salmon total returns were estimated to be 690 fish yielding a spawning escapement estimate of 443 fish (Table 6).

Catch data for large salmon angling on public waters indicated that total returns to the river system were 1620 fish (Table 6), whereas the estimate derived following the method used by Atkinson and Hooper (1995) yielded a more conservative estimate of 810 large salmon (Table 6). The latter number is consistent with the estimate of 920 total large salmon returns that was obtained from the recapture trapnet (Table 6), and suggests as well, that escapement was sufficient to meet and probably exceed the conservation requirement for large salmon on this river. However, it should be noted that the small salmon total return estimate of 690 fish, upon which, the total return of 810 large salmon is based (the Atkinson and Hooper (1995) method) is 12% higher than the estimate of 615 total small salmon returns obtained from the recapture trapnet data. Therefore, the trapnet sample and the public water angling sample did not always yield comparable results.

In 1998

Total Returns, Spawning Escapement, and Conservation Requirement

The data indicate that the most probable estimate of total returns to the river were 2900 fish (Fig. 4). Further analysis indicated that total returns of small and large salmon were 1800 and 1200 respectively (Table 6). The large salmon total returns are 85% of those reported for this river in 1994 (1414: Atkinson and Hooper 1995) and 30% higher than those reported in 1996 (920; Bradford and Joe 1996 unpublished data). Similarly, the small salmon total returns are 69% higher than those reported for 1994 (1067; Atkinson and Hooper 1995) and 200% higher than those reported in 1996 (600; Bradford and Joe 1996 unpublished data). After subtracting removals, spawning escapement for small and large salmon was 1766 (95% CI: 866-7366) and 1180 (95% CI: 680-5580) respectively. The probability of having achieved the required numbers of small (Fig.

5) and large (Fig. 6) salmon was 100% for both. Based on fecundity values derived from stock characteristics observed in the current year (Table 7), total egg deposition was estimated at 364% of the conservation requirement for this system. Although the confidence intervals surrounding the 1998 estimates are large, the total number of physically handled fish in all fisheries (less removals), represents 46% of the egg requirement for the watershed assuming all fish spawned.

Sources of uncertainty

The assumption that the exploitation rates for marked and unmarked fish, for either large or small salmon, are the same in the native gillnet food fishery needs to be verified. The reporting rate for recaptures from this fishery is poor and yet fish removals via gillnets can represent substantial portions of the total returns in some years.

The extent of the fall salmon run that had already migrated upstream before the onset of the mark recapture experiment is unknown.

The 1998 population estimate may be an overestimate. Generally, availability of salmon to capture appeared to be low due to high water conditions and the rapid ascent of the river by fish. Consequently both the number of fish tagged and recaptured was low relative to previous years. Confidence limits for this estimate are large and should be considered in any management decisions.

As was the case for the three previous assessments, fecundity estimate values for Miramichi fish have been used. Direct measurements could, and should, be obtained from food fish removed from assessment trapnets by the First Nation crews operating them, as well as by guardians from the First Nation gillnet fishery.

Change in catch per effort with time (years) in the angling fishery would have been more effectively evaluated with a more timely delivery of the catch statistics.

Estimates of hook and release mortality for large and small salmon which reflect both the behaviour of the anglers and environmental conditions on this river would improve the accuracy of the stock parameters estimated by mark-recapture experiments. These data could probably be obtained with the cooperation of at least one of the angling groups on the river. It is already the policy of the Tabusintac Club to delay, (by holding in live boxes) for 24h, the harvest of any small salmon which is thought to be mortally wounded as a consequence of capture by hook and line by Club members (Bill MacEachern, Tabusintac Club, personal communication).

Ecological Considerations

Anglers reported that autumn discharge in the Tabusintac system was much higher in 1998 than in 1996 and during any of the previous assessments (Atkinson and Claytor 1994; Atkinson and Hooper 1995). Higher discharge most likely reduced residence time of salmon in pools and resulted in below average angling on both public and leased waters. Few salmon were observed within the river proper until the first week of October which coincided with trapnet catches and a raise in water (Bill MacEachern, Tabusintac Club, personal communication). One high water event in October restricted angling (both public and lease) for a period of a few days.

Reports of salmon in the upper reaches of the Tabusintac's head waters beyond the lease may indicate that salmon had unrestricted access early in the season. Good water conditions in late October coincided with the initiation of redd digging in some tributaries (Herman Harding, Tabusintac Club, personal communication).

Forecast/Prospects

Atkinson and Claytor (1994) examined the relationship between small salmon angling catch in one year and large salmon angling catch the following year and concluded that forecasting by this means was not possible. As stated by Atkinson and Hooper (1995), it may be possible to develop in-season forecasting using run-timing to the trapnets, but only when a sufficient number of years of trapnet operation have accumulated.

The available data suggest that the stock of Atlantic salmon in the Tabusintac is stable and that the population is continuing to meet its conservation requirement.

Management Considerations

The conservation requirement for the Tabusintac River was met in 1998 with the egg requirement exceeded by 364%. In light of the potentially high population estimate, the chances that the egg requirement was less than 364% may also be high. The river continues to produce a harvestable surplus of both large and small salmon, however, the extent of this surplus is unknown. In view of the inability to forecast returns on a year to year basis, diligent monitoring of removals in both native food fisheries and small salmon angling fisheries would be prudent.

The conservation requirement for the Tabusintac River has been exceeded in all 4 years the salmon population has been assessed. It is reasonable to assume that the river will continue to meet its conservation requirement in 1999.

It would seem prudent that harvest levels for 1999 reflect the fact that total returns in 1998 may have been overestimated, and that mortality factors associated with winter sea habitat have impacted total returns to many of the salmon rivers of eastern Canada in recent years. Furthermore, the Tabusintac River is not exceptional to the fact that returns of 2SW maiden salmon have dwindled in many Maritime salmon rivers in recent years

Research Recommendations

<u>To improve future stock assessments:</u>

1. Continue to estimate returns of adult salmon to the Tabusintac River.

2. Improve the capture efficiency of the recapture trap.

3. Continue the telephone creel survey, to obtain tag returns and evaluate DNRE catch estimates.

4. Obtain direct measurements of fecundity from the Esgenoôpetitj First Nation food fishery.

5. In partnership with all client groups, develop new criteria for recovering tags in the event that sufficient recaptures cannot be obtained from the trapnet program or from the angling fisheries. Options could include swim through snorkel counts and/or seining pools in non-tidal waters of the river.

6. Obtain hook and release mortality estimates that are specific to the Tabusintac River environment and its anglers.

To improve explanatory power:

1. Resume electroseining surveys to determine the extent of salmon spawning and juvenile densities.

2. Evaluate more accurately the proportions of 2 sea-winter salmon as well as repeat spawners by updating database of salmon ages from scales.

Acknowledgements

We thank Gérald Chaput, Gary Atkinson, Tim Lutzac, Dave Moore, John Hayward, and Joe Sheasgreen of the federal Department of Fisheries and Oceans for their keen interest in this year's assessment and for the substantive logistic support extended to Esgenoôpetitj First Nation over the duration of the study in 1996 and 1998. Special thanks are due to Mr. Gérald Chaput and Mr. Gary Atkinson for their unselfish assistance with analyses, comments and discussion throughout all phases of the project. We are indebted to John Hayward for researching all stocking records for the Tabusintac River. We thank Robert Bryan, Bill MacEachern, Herman Harding, and Reid Wishart of the Tabusintac Club for their encouragement and for sharing in their knowledge of the river and its resources. We also thank the many fishers of the public waters who participated in the telephone interviews and for their frequent stops at the traps to inquire about the project. The contribution of the attendees of the Salmon Science Workshop (Appendix 1) is gratefully acknowledged.

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Table 1. Esgenoôpetitj First Nation harvest of Atlantic salmon from gillnet and trapnet fisheries in the Tabusintac River for years 1992-1998.

	Gill nets		Trapnets		Total	
Year	Large	Small	Large	Small	Large	Small
1992	270	126	0	0	270	126
1993	64	48	37	31	101	79
1994	28	22	16	8	44	30
1995	42	106	0	0	42	106
1996	154	142	33	29	187	171
1997	na	na	na	na	na	na
1998	16	18	2	0	18[1]	18[2]

[1]communal allocation of 304 bright large salmon was not met
[2]communal allocation of 112 bright small salmon was not met.

Table 2. Atlantic salmon angling catch on the Tabusintac River, 1969-1998. Estimates provided by DNRE except for 1996 and 1998 which were obtained through a DFO telephone survey of anglers who fished public waters. Dashes (-) indicate insufficient data to calculate. The 1998±Mean@0.8 reflects the strength of the 1998 fishery assuming the anglers interviewed by telephone accounted for 80% of all effort on public waters.

		Total Bright Salmon							
		Small			Large	Total			
Year	Source	Kept	Released	Total	Released	Catch	% Large	Rods	CPUE
1969	DNRE	126	-	126	133	259	51.4	-	-
1970	DNRE	46	-	46	25	71	35.2	-	-
1971	DNRE	24	-	24	31	55	56.4	-	-
1972	DNRE	67	-	67	244	311	78.5	-	-
1973	DNRE	107	-	107	114	221	51.6	-	-
1974	DNRE	28	-	28	68	96	70.8	-	-
1975	DNRE	115	-	115	49	164	29.9	-	-
1976	DNRE	228	-	228	43	271	15.9	773	0.351
1977	DNRE	-	-	-	-	-	-	84	-
1978	DNRE	101	-	101	66	167	39.5	1634	0.102
1979	DNRE	15	-	15	-	15	-	366	0.041
1980	DNRE	115	-	115	69	184	37.5	804	0.229
1981	DNRE	166	-	166	14	180	7.8	627	0.287
1982	DNRE	261	-	261	153	414	37.0	1359	0.305
1983	DNRE	90	-	90	140	230	60.9	1540	0.149
1984	DNRE	123	-	123	68	191	35.6	1118	0.171
1985	DNRE	19	-	19	38	57	66.7	229	0.249
1986	DNRE	129	-	129	301	430	70.0	1147	0.375
1987	DNRE	116	-	116	258	374	69.0	598	0.625
1988	DNRE	77	103	180	359	539	66.6	437	1.233
1989	DNRE	122	62	184	165	349	47.3	531	0.657
1990	DNRE	64	31	95	80	175	45.7	740	0.236
1991	DNRE	70	84	154	84	238	35.3	847	0.281
1992	DNRE	227	103	330	488	818	59.7	1663	0.492
1993	DNRE	102	156	258	191	449	42.5	1087	0.413
1994	DNRE	193	135	328	316	644	49.1	1693	0.380
1995	DNRE	33	0	33	22	55	40.0	29	1.900
1996	DFO	71	57	128	73	201	36.0	377	0.533
1997	DNRE	72	54	126	63	189	33.3	296	0.639
1998	DFO	13	21	34	46	80	57.5	301	0.266
Mean (93-97)		94	80	175	133	308	40.2	696	0.773
98±Mean		-86%	-74%	-81%	-65%	-74%	43%	-57%	-66%
98±Mean@0.8		-83%	-67%	-76%	-57%	-68%	79%	-46%	-57%

Table 3. Daily and cumulative catches of small and large salmon in the Tabusintac River traps, fall 1996. Dates corresponding to standard weeks are shown.

Daily Catch

	Marking Trap		Recapture Trap		Combined Catch	
Date	Small	Large	Small	Large	Small	Large
27-Sep	6	3	4	2	10	5
28-Sep	11	10	2	1	13	11
29-Sep	6	7	5	1	11	8
30-Sep	10	9	0	0	10	9
1-Oct	11	7	6	1	17	8
2-Oct	9	11	10	6	19	17
3-Oct	7	7	4	2	11	9
4-Oct	14	8	5	1	19	9
5-Oct	7	5	7	0	14	5
6-Oct	3	2	0	0	3	2
7-Oct	onf	onf	onf	onf	onf	onf
8-Oct	onf	onf	onf	onf	onf	onf
9-Oct	24	6	4	0	28	6
10-Oct	10	14	8	8	18	22
11-Oct	8	13	2	1	10	14
12-Oct	33	40	5	6	38	46
13-Oct	4	6	4	5	8	11
14-Oct	1	3	2	1	3	4
15-Oct	onf	onf	3	9	3	9
16-Oct	12	21	3	3	15	24
17-Oct	1	3	2	0	3	3
18-Oct	5	5	4	1	9	6
19-Oct	0	0	5	1	5	1
20-Oct	2	3	2	1	4	4
21-Oct	1	7	2	2	3	9
22-Oct	1	1	2	4	3	5
23-Oct	3	3	3	3	6	6
24-Oct	0	2	1	1	1	3
25-Oct	4	5	0	2	4	7
26-Oct	0	3	0	2	0	5
27-Oct	onf	onf	onf	onf	onf	onf
28-Oct	2	6	0	0	2	6
29-Oct	0	2	0	0	0	2
30-Oct	1	1	1	2	2	3
31-Oct	0	1	0	0	0	1
1-Nov	0	1	0	2	0	3
2-Nov	0	0	0	1	0	1

onf = trap operating but not fished

Weekly Catch

Standard	Marking Trap		Recapture Trap		Combined Catch	
Week	Small	Large	Small	Large	Small	Large
39	33	29	11	4	44	33
40	51	40	32	10	83	50
41	80	82	25	21	105	103
42	21	39	21	17	42	56
43	10	20	6	12	16	32
44	1	5	1	5	2	10
Totals	196	215	96	69	292	284

Cumulative Catch

Standard	Marking Trap		Recapture Trap		Combined Catch	
Week	Small	Large	Small	Large	Small	Large
39	33	29	11	4	44	33
40	84	69	43	14	127	83
41	164	151	68	35	232	186
42	185	190	89	52	274	242
43	195	210	95	64	290	274
44	196	215	96	69	292	284

Standardized Weeks 1996

Week	Month	Days
39	September	23 - 29
40	October	30 - 06
41	October	07 - 13
42	October	14 - 20
43	October	21 - 27
44	October	28 - 03

Table 4. Daily and cumulative catches of small and large salmon in the Tabusintac River traps, fall 1998. Dates corresponding to standard weeks are shown.

Daily Catch

	Marking Trap		Recapture Trap		Combined Catch	
Date	Small	Large	Small	Large	Small	Large
22-Sep	0	0	3	0	3	0
23-Sep	1	0	3	0	4	0
24-Sep	18	5	2	2	20	7
25-Sep	2	3	0	0	2	3
26-Sep	0	1	4	0	4	1
27-Sep	6	3	2	0	8	3
28-Sep	0	2	3	1	3	3
29-Sep	3	2	0	1	3	3
30-Sep	1	0	0	0	1	0
1-Oct	7	0	0	0	7	0
2-Oct	17	6	1	1	18	7
3-Oct	7	3	0	1	7	4
4-Oct	6	11	0	1	6	12
5-Oct	2	3	1	0	3	3
6-Oct	2	1	1	1	3	2
7-Oct	2	1	0	0	2	1
8-Oct	3	2	0	1	3	3
9-Oct	0	0	0	0	0	0
10-Oct	3	2	0	0	3	2
11-Oct	0	1	2	0	2	1
12-Oct	2	0	0	0	2	0
13-Oct	3	5	0	0	3	5
14-Oct	0	4	0	0	0	4
15-Oct	1	4	0	1	1	5
16-Oct	1	1	0	0	1	1
17-Oct	2	0	0	0	2	0
18-Oct	0	2	0	0	0	2
19-Oct	0	2	0	0	0	2
20-Oct	0	2	0	0	0	2
21-Oct	0	1	0	0	0	1
22-Oct	0	0	0	0	0	0
23-Oct	0	0	0	0	0	0
24-Oct	0	0	0	0	0	0
25-Oct	0	0	0	0	0	0
26-Oct	0	0	0	0	0	0
27-Oct	0	0	0	0	0	0
28-Oct	0	0	0	0	0	0
29-Oct	0	0	0	0	0	0
30-Oct	onf	onf	onf	onf	onf	onf
31-Oct	0	0	0	0	0	0

onf = trap operating but not fished

Weekly Catch

Standard	Marking Trap		Recapture Trap		Combined Catch	
Week	Small	Large	Small	Large	Small	Large
38	1	0	6	0	7	0
39	30	16	11	4	41	20
40	43	25	3	4	46	29
41	11	14	2	1	13	15
42	4	12	0	1	4	13
43	0	0	0	0	0	0
44	0	0	0	0	0	0
Totals	89	67	22	10	111	77

Cumulative Catch

Standard	Marking Trap		Recapture Trap		Combined Catch	
Week	Small	Large	Small	Large	Small	Large
38	1	0	6	0	7	0
39	31	16	17	4	48	20
40	74	41	20	8	94	49
41	85	55	22	9	107	64
42	89	67	22	10	111	77
43	89	67	22	10	111	77
44	89	67	22	10	111	77

Standardized Weeks 1998

Week	Month	Days
38	September	17 - 23
39	September	24 - 30
40	October	01 - 07
41	October	08 - 14
42	October	15 - 21
43	October	22 - 28
44	October	29 - 04

Table 5. Historical stocking records of Atlantic salmon to the Tabusintac River.

Year	Month	Day	Origin	Life Stage	Number of Fish Stocked
1953	07	22	Restigouche	0+ parr	39,000
1953	08	20	Restigouche	0+ parr	30,000
1953	09	22	Restigouche	0+ parr	27,376
1954	07	12	Restigouche	0+ parr	37,500
1954	08	27	Restigouche	0+ parr	21,000
1954	09	21	Restigouche	0+ parr	20,000
1954	11	15	Restigouche	0+ parr	21,000
1956	06	25	Miramichi	0+ parr	75,000
1956	06	27	Miramichi	0+ parr	75,000
1957	06	18	Miramichi	0+ parr	90,000
1957	07	17	Miramichi	0+ parr	56,000
1958	07	25	Miramichi	0+ parr	33,000
1958	09	10	Miramichi	0+ parr	30,000
1958	09	15	Miramichi	0+ parr	24,000
1958	09	26	Miramichi	0+ parr	15,200
1959	08	04	Restigouche	0+ parr	36,000
1959	08	25	Restigouche	0+ parr	24,000
1960	07	20	Restigouche	1+ parr	7,200
1960	07	25	Restigouche	0+ parr	44,000
1961	10	16	Restigouche	1+ parr	4,600
1962	06	12	Restigouche	2+ smolts	550
1962	07	13	Restigouche	0+ parr	33,000
1962	07	25	Restigouche	0+ parr	32,000
1962	10	09	Restigouche	1+ parr	3,700
1962	10	09	Restigouche	0+ parr	18,250
1963	06	06	Miramichi	2+ smolts	500
1963	06	06	Restigouche	2+ smolts	210
1963	07	10	Restigouche	1+ parr	5,250
1963	09	12	Restigouche	0+ parr	20,000
1963	10	07	Restigouche	1+ parr	4,100
1964	06	02	Restigouche	2+ smolts	3,100
1964	06	29	Restigouche	1+ parr	8,800
1964	09	03	Restigouche	0+ parr	16,250
1965	05	19	Restigouche	2+ smolts	3,950
1965	06	08	Restigouche	2+ smolts	1,500
1965	07	27	Restigouche	0+ parr	10,000
1965	08	30	Restigouche	2+ smolts	500
1965	09	02	Restigouche	2+ smolts	300
1965	09	02	Restigouche	0+ parr	11,250
1965	10	21	Restigouche	0+ parr	6,800
1966	06	28	Restigouche	2+ smolts	2,044
1966	10	04	Restigouche	0+ parr	17,000
1966	10	12	Restigouche	1+ parr	9,500
1966	11	07	Restigouche	0+ parr	10,450
1967	06	16	Restigouche	2+ smolts	980
1967	06	16	Restigouche	2+ smolts	4,000
1967	10	12	Restigouche	0+ parr	13,000
1967	10	21	Restigouche	1+ parr	4,800
1968	05	21	Restigouche	2+ smolts	4,950
1968	06	04	Restigouche	1+ parr	1,100
1968	10	29	Restigouche	0+ parr	7,750
1969	10	27	Miramichi	1+ parr	2,400
1970	06	16	Restigouche	2+ smolts	1,414
1971	05	13	Restigouche	2+ smolts	541
1971	05	13	Restigouche	2+ smolts	1,500
1971	10	12	Miramichi	0+ parr	26,400
1971	10	27	Miramichi	0+ parr	18,400
1973	10	24	Miramichi	0+ parr	10,360

Table 6. Summary of data used to estimate stock parameters, and the estimated stock parameters for large and small Atlantic salmon in the Tabusintac River, 1996 and 1998. Recapture samples were either from the recapture trapnet, public water angling (P), or leased water angling (L).

	Recapture	Mark-Recapture Data			Total Returns				Spawning	% Egg
Salmon	Sample	M	C	R	Mode	Median	0.025	0.975	Escapement	Requirement Met
1996										
Small	Trapnet	145	93	22	**615**	630	**450**	**975**	**368**	**1**
Small	Angling (P)	177	109	28	690	714	530	1026	443	2
Large	Trapnet	190	68	14	**920**	1000	**640**	**1750**	**731**	**244**
Large	Angling (P)	208	70	9	1620	1860	1040	3980	1431	478
[1]Ratio .46:.54	Both Traps									
Large		na	na	na	810	838	622	1204	621	207
Combined	Trapnet	335	161	36	1500	1540	1170	2120	na	na
Ratio .46:.54	Both Traps									
Small		na	na	na	690	710	530	990	443	2
Large		na	na	na	810	830	620	1150	621	207
1998										
Small	Trapnet	81	21	2	na	na	na	na	na	na
Small	Angling (L)	81	39	1	na	na	na	na	na	na
Large	Trapnet	65	10	0	na	na	na	na	na	na
Large	Angling (L)	65	31	2	na	na	na	na	na	na
Combined	Combined	146	101	5	**2900**	3900	1600	12900	na	na
Ratio .57:.43	Both Traps									
Small		na	na	na	**1800**	2200	**900**	**7400**	**1766**	**6**
Large		na	na	na	**1200**	1700	**700**	**5600**	**1180**	**358**

[1] Mark-recapture data is not applicable (na) because estimate is based on total returns of small salmon and ratio of large:small salmon observed at both trapnets.

Table 7. Calculation of % egg requirement met for the Tabusintac River in 1998. Stock characteristics based on observations from the current year.

Area surveyed: Total habitat (m^2) (Atkinson and Hooper 1995)	
Tabusintac River main	610333
Big Eskedelloc River	75750
North Brook	21109
Middle Brook	6190
Pisiguit Brook	18208
Big Hole Brook	92704
Total	**824294**

Stock characteristics - current year	
Male proportion of large salmon	0.24
Female proportion of large salmon	0.76
Mean length of large female salmon (cm)	81.5
Eggs per large female (1.4132 x LN(FL) + 2.7560)(Randall 1985)	7902
Eggs per large salmon (eggs / female x % female)	6006
Male proportion of small salmon	0.98
Female proportion of small salmon	0.02
Mean length of small female salmon (cm)	54.6
Eggs per small female (3.1718 x LN(FL) - 4.5636)(Randall 1985)	3374
Eggs per small salmon (eggs / female x % female)	67

Calculation of % egg target met	
Egg deposition rate (no. / m^2) (CAFSAC MS 1991)	2.4
Total area (m^2) (Atkinson and Hooper 1995)	824294
Egg Requirement (Total area x deposition rate)	1978306
Large spawning escapement	1180
Total large eggs	7086946
% egg target met by large salmon	**358**
Small spawning escapement	1766
Total small eggs	119152
% egg target met by small salmon	**6**
% egg target met by all salmon	**364**

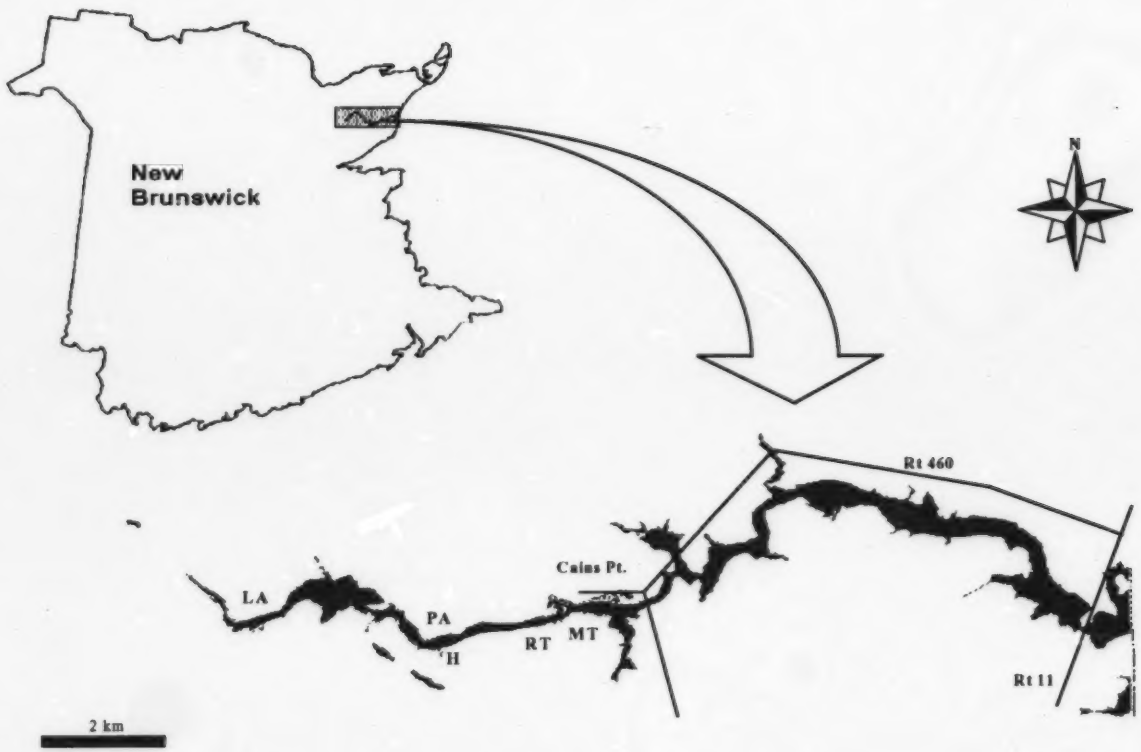

Figure 1. Tabusintac watershed and trapnet locations for 1998. **MT** - Marking Trap; **RT** - Recapture Trap; **H** - Head of Tide; **PA** - Public Angling; **LA** - Lease Angling.

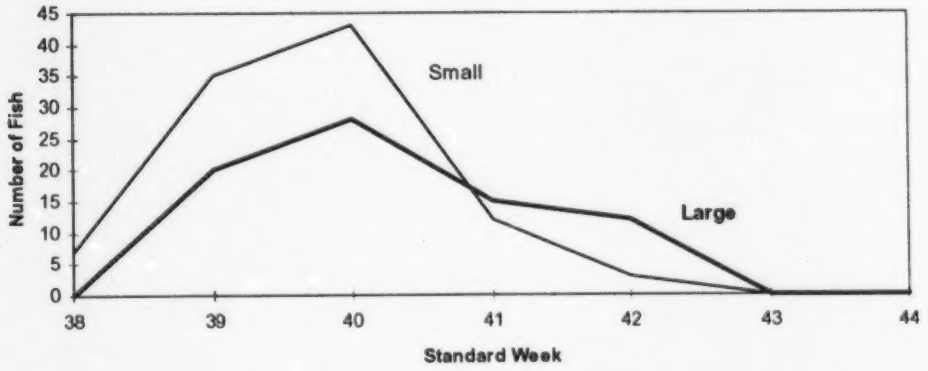

Figure 2. Run timing of Atlantic salmon in the Tabusintac River, fall 1998 (n = 75 large salmon; n = 100 small salmon).

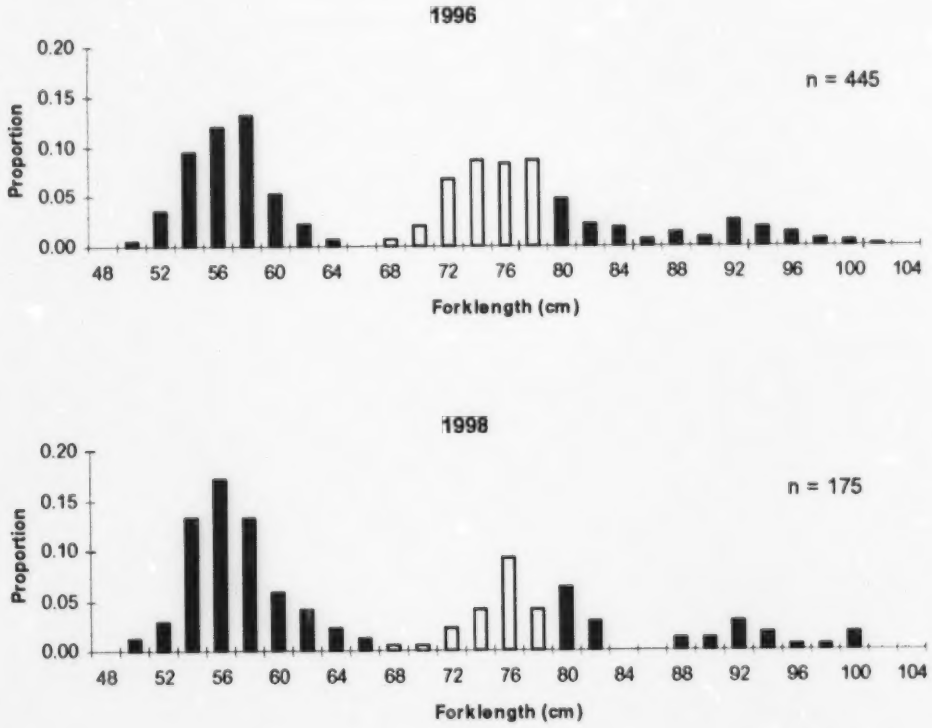

Figure 3. Length frequency distribution of salmon caught at research traps in the Tabusintac River, 1996 and 1998. Highlighted bars indicate proportion of 2 sea-winter Atlantic salmon.

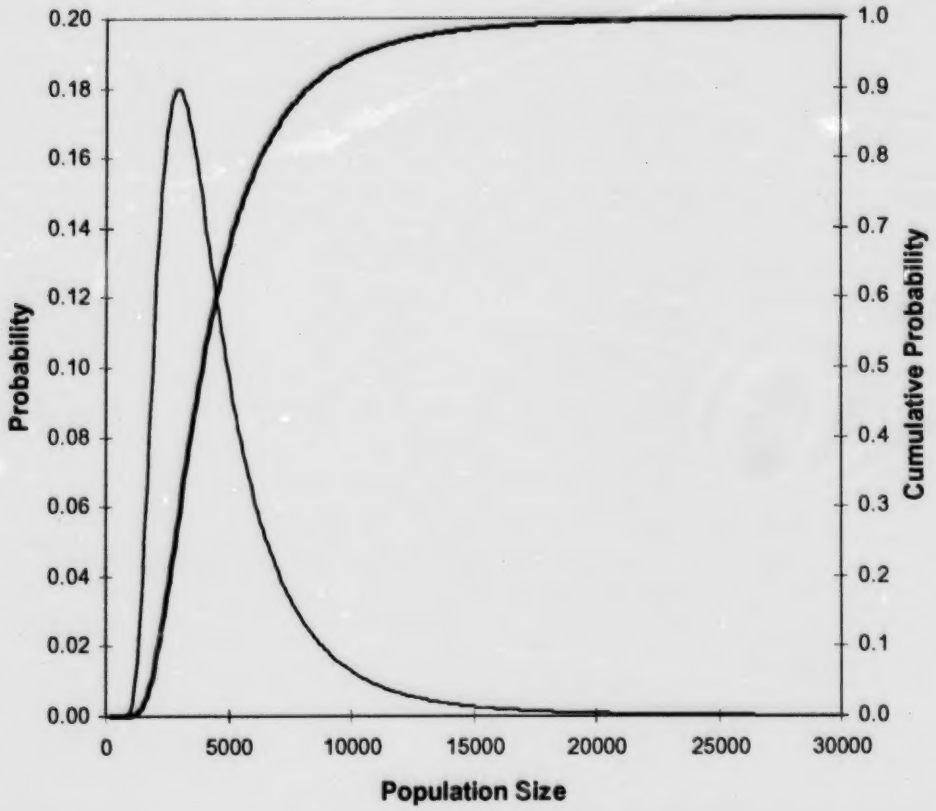

Figure 4. Bayesian estimate of combined total returns of large and small salmon to the Tabusintac River, fall 1998. Highest probability of combined total returns = 2900 fish.

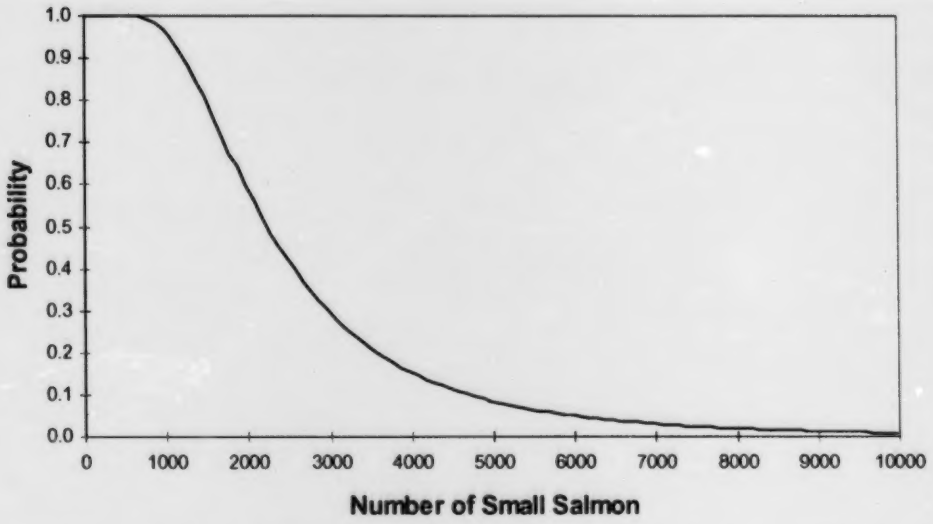

Figure 5. Probability of achieving spawning escapement for small salmon (175 fish: 1.00) in the Tabusintac River, fall 1998.

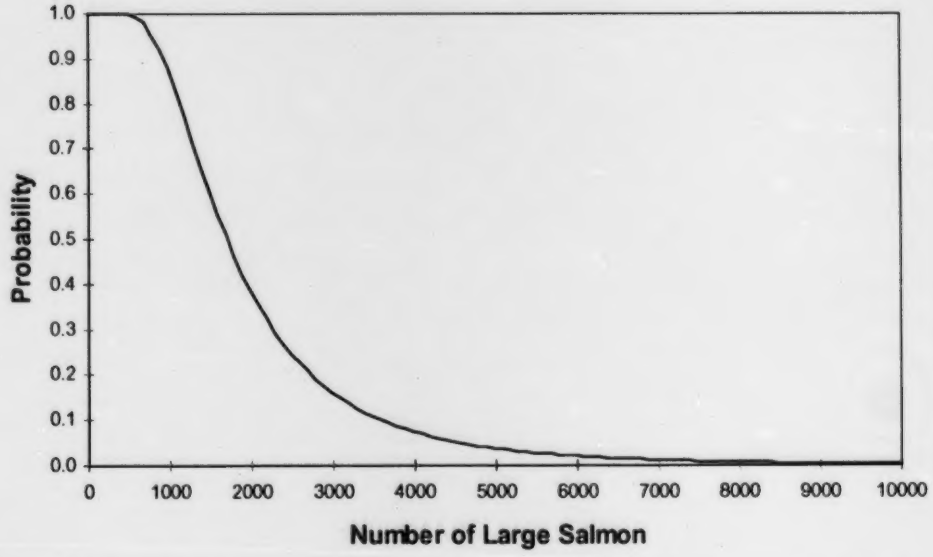

Figure 6. Probability of achieving spawning escapement for large salmon (329 fish: 1.00) in the Tabusintac River, fall 1998.

Appendix 1. Record of client consultation for the status of Atlantic salmon in the Tabusintac River, fall 1998.

1. SPECIES / STOCK:

- **Atlantic salmon - Tabusintac River**

2. ARRANGEMENTS:

DATE: March 11, 1999
TIME: 13:00 to 15:00
LOCATION: Esgenoôpetitj First Nation Learning Center, Burnt Church, New Brunswick

3. FORM OF CONSULTATION (Science Workshop, ZMAC, ETC.)

- Science workshop

4. PARTICIPANTS (Name and Affiliation)

- Burton Martin, Esgenoôpetitj First Nation Chief
- Chris Bonnell, Esgenoôpetitj First Nation Councilor
- Don Swasson, Esgenoôpetitj First Nation Trapnet Program Coordinator
- Scott Douglas Esgenoôpetitj First Nation Fisheries Biologist
- Wayne Thompson, DFO Conservation and Protection, Neguac
- Gérald Chaput, DFO Science, Moncton
- Tim Lutzac, DFO Science, Biologist for Aboriginal Fisheries, Moncton
- Bernie Dubee, Regional Biologist, Department of Natural Resources and Energy, Miramichi City
- Reid Wishart, Tabusintac Club
- Herman Harding, Tabusintac Club
- Bliss M^{ac}Intosh, Tabusintac Fish and Game Association
- James Breau, Tabusintac fish and Game Association
- Lee Farrell, Tabusintac Watershed Committee

5. NEW INFORMATION BROUGHT FORWARD (what? by who?)

- Stock status in 1998 (Scott Douglas, Esgenoôpetitj First Nation Fisheries Biologist)
- No observations of salmon (small or large) in any gillnets by any DFO conservation and protection officers in 1998 (Wayne Thompson, DFO, Conservation and Protection, Neguac)

6. CONCERNS RAISED BY CLIENTS (include concerns, plus follow-up action/response made or committed).

- Participants agreed that in spite of a potential overestimate of large and small salmon in 1998, there were sufficient numbers of fish to meet the spawning requirement.
- The appropriateness of applying a 3% hook and release mortality factor to the released component of fish in the angling fisheries was questioned by participants. Some felt that 3% may be an underestimate of the true hook and release mortality, especially during the black salmon season in the spring.

- Although no cases of poaching were documented in 1998, some poaching may have occurred. It is difficult to choose an arbitrary number to reflect the amount of poaching, when no apprehensions are made.

7. RECOMMENDATIONS:

a.) Pertaining to Assessment

b.) Pertaining to next year's work plans

- Continue assessment of adults returning to the Tabusintac River in 1999
- Resume juvenile surveys
- Biological sampling of First Nation food fish to evaluate fecundity of Tabusintac salmon

Other Concerns:

Scott Douglas
NAME OF PRESENTER

Gérald Chaput
NAME OF RAPPORTEUR